

Civil Engineering

Sr. No.	Course Code	Course Name	L	T	P	Credits
1	CE3CO02	Water & Waste Water Engineering	3	0	2	4
2	CE3CO03	Engineering Geology	3	0	2	4
3	CE3CO06	Structural Analysis -I	3	1	2	5
4	CE3CO09	Transportation Engineering	3	0	2	4
5	CE3EL04	Building Maintenance & Repairs	3	0	0	3
6	EN3BS03	Engineering Mathematics-III	3	1	0	4
7	EN3MC01	Self Study (MOOC)	1	0	0	0
		Total	19	2	8	24
		Total Contact Hours	29			

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Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
CE3CO02	Water & Waste Water Engineering	3	0	2	4

Unit-I

Estimation surface water resources, Ground water velocity, springs, galleries, wells, tube well, quality of water from different sources, demand & quantity of water, fire demand, water requirement for various uses, fluctuations in demand, and forecast of population.

Unit -II

Intake structure, conveyance of water, pipe materials, pumps - operation & pumping stations. Layout and hydraulics of different distribution systems, pipe fittings, valves and appurtenances, analysis of distribution system. Hardy cross method, leak detection, maintenance of distribution systems, service reservoir capacity and height of reservoir.

Unit -III

Impurities of water and their significance, water-borne diseases, physical, chemical and Bacteriological analysis of water, water standards for different uses, water treatment methods:- Operation & Design of sedimentation , Coagulation , Filtration, Disinfection , Flocculation , Aeration , Hardness removal & miscellaneous treatments , Rural water supply scheme, Water pollution control act.

Unit- IV

Sewerage schemes and their importance, collection & conveyance of sewage, storm water Quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & Maintenance of sewer, sewer appurtenances , Conservancy and water carriage system.

Unit V

Characteristics and analysis of waste water, recycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, TOD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e. by land treatment & by dilution, self-purification capacity of stream, Oxygen sag analysis.

Text Books

1. B. C. Punmia , Water Supply Engineering- - Laxmi Publications (P) Ltd. New Delhi.
2. G.S. Birdi , Water Supply & Sanitary Engineering- - Dhanpat Rai Publications (P) Ltd. New Delhi.
3. Metcalf & Eddy, Waste Water Engineering - -McGraw Hill Book Company New Delhi

Reference Books

1. H. S. Peavy, D. R. Rowe, Environmental Engineering- - Mc-Graw Hill Book Company, New Delhi.
2. S.C. Rnagwala, Warer Supply And Sanirary Engineering , Charotar Publishing House Pvt. Ltd. , Gujrat
3. G.M. Fair, J.C. Geyer , Water & Waste Water Technology -, New York Wiley.

Proposed List of Practicals

1. To study the various standards for water.
2. To study the sampling techniques for water and waste water.
3. To determine the turbidity of water and waste water.
4. To deter mine the coagulant dose required to treat the given turbid water sample
5. To determine the concentration of chlorides in a given water samples
6. Determination of hardness of the given sample
7. Determination of residual chlorine
8. Determination of Alkalinity in a water samples
9. Determination of Acidity in a water samples
10. Determination of Dissolved Oxygen (DO) in the water sample.



Course Code	Course Name	Hours per Week			Total
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CE3CO03	Engineering Geology	3	0	2	4

Unit-I Introduction, Scope and Objects of Geology

Introduction to various branches of Geology useful to Civil Engineering , Interior, Age and Origin of Earth, Studies regarding Earthquake, Volcanic activities weathering and Erosion, formation of Soils , Soil profile, Geological Classification of soils, concept of plate tectonics.

Unit -II Mineralogy and Crystallography

Introduction to subject of Mineralogy and Crystallography and their Impotence, Definition and classification of Minerals , Physical properties of Minerals ,Rock forming minerals important in Civil Engineering, Elements of Crystallography and Introduction to Crystal Systems.

Unit –III Petrology and Geology of India

Rocks, Definition and types Igneous, Sedimentary, Metamorphic Rocks, their formation, classification and characteristics, features and forms , Important Rocks useful in Construction Industry.

Introduction of Geological time scale , Physical features of India and Brief Geological history of India.

Unit-IV Structural Geology

Structures related to Rocks : Dip , Strike and out crops, Detailed study and classification of Faults, folds, unconformities and joints, their importance in various site selection of engineering structures like Dams, Tunnels, Bridges etc.

Unit-V Applied Geology and Remote Sensing

Introduction to various branches of Applied Geology , Consideration for selection of site for roads , bridges ,dams , Reservoirs and Tunnels, water bearing strata, Artisan Aquifers stability of hill side slopes and Prevention of Engineering structures from Earthquakes.

Importance of Remote Sensing in Civil Engineering and its application in location of various engineering sites.

Text Books

1. H. H. Read , Rutley's Elements of Minerology - Blackie & Son's .Publication Pvt. Ltd.
2. M.S. Krishanan, Geology of India & Burma - CBS Publications
3. G.W. Tyrrell , The Principle of Petrology - B.I. Publication Pvt.Ltd.

Reference books

1. P.K Mukherjee, "A text book of geology" Oxford University Press.
2. S.K Garg, "A text book of physical and engineering geology" Khanna Publishers.
3. Prabin Singh, "Engineering and general geology" S.K. Kataria Publishers.



Proposed List of Practicals

1. Study of Physical properties of minerals in Hand specimen.
2. Study of Igneous Rocks in handspecimen
3. Study of Sedimentary Rocks in handspecimen
4. Study of Metamorphic Rocks in handspecimen
5. Study of fold form Geological maps
6. Study of fault from Geological maps.
7. Study of unconformity from Geological maps
8. Study of sills from Geological maps.
9. Study of Dykes from Geological maps.
10. Study of symbols used in topographical maps.



Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
CE3CO06	Structural Analysis –I	3	1	2	5

Unit-I Determinate and Indeterminate Structure

static and kinematic indeterminacy of beams, frames, Analysis of statically determinate trusses by method of joint and section. Analysis of continued beam by three moment theorem

Unit-II Strain Energy Method

Unit load method for determination of slope and deflection of beams and frames and deflection of truss, principal of virtual work, Maxwell & Betti law of reciprocal deflections, method of consistent deformation

Unit-III Influence Line Diagrams

Rolling loads and Influences lines for determinate beams, Muller Breslau principle

Unit-IV Displacement method

Analysis of beam, frames by slope deflection method and moment distribution method (without sway).

Unit-V Arches, Cables and Suspension Bridges

Arches: Three hinged parabolic and circular arches, Two hinged arches, Cable and Suspension bridges.

Text Books

1. C S Reddy, Basic Structural Analysis, Tata McGRAW Hill, New Delhi.
2. S Ramamrutham, Theory of Structures Analysis, Dhanpat Rai Publishing Company
3. Norris and Wilbur, Structural Analysis, McGRAW Hill International.

References Books

1. Timoshenko and Young, Theory of Structural Analysis, McGRAW Hill International.
2. V. N. Vazirani and M MRatwani, Analysis of Structures, Khanna Publishers, New Delhi.
3. MCWang C.K., Indeterminate Structural Analysis, McGRAW Hill, New York

Proposed List of Practicals:-

1. To verify clerk's Maxwell Reciprocal Theorem.
2. To determine slope and deflection of a beam with one end hinged and other end roller.
3. To determine slope and deflection of an overhanging beam.
4. To obtain influence line diagram for bending moment and shear force of a simply supported beam.
5. To find horizontal thrust at support of a three hinged arch.
6. To find horizontal thrust and displacement in a two hinged arch.
7. To obtain influence line diagram for horizontal thrust of arch.
8. To determine horizontal thrust and sway on portal frame due to horizontal load.
9. Study of a pin jointed truss.
10. Study of suspension bridge.

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Course Code	Course Name	Hours per Week			Total
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CE3CO09	Transportation Engineering	3	0	2	4

Unit-I Highway planning, Alignment & Geometric Design

Principles of highway planning, road planning in India and financing of roads, classification patterns, Requirements, Engineering Surveys for highway location. Cross sectional elements-width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, Numerical problems.

Unit-II Design of Flexible Pavement

Introduction of WBM, WMM, BM, IBM, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction, fillers and sealers.. Cutback & Emulsions modified Bitumen IRC/IS Standards. Design of flexible pavement as per IRC: 37-2012, design of Marshall mixes and stability.

Unit-III: Design of Rigid pavement

Pavement design factors - design wheel load, equivalent single wheel load, repetition of loads, equivalent wheel load factors, and strength characteristics of pavement materials, climatic variation, and, design of rigid pavement as per IRC: 58-2011-Stresses in rigid pavements, critical load positions, combined loading and temperature stresses ,Transverse joints, longitudinal joints, dowel bars, tie bars.

Unit-IV Maintenance and failure of pavements

Surface and sub-surface drainage, highway materials: properties and testing etc. Pavement strengthening: object types & design of overlays. Pavement failures and maintenance Fatigue and reliability.

Unit -V Airport Planning, Runway & Taxiway

Airport site selection air craft characteristic and their effects on runway alignments, wind-rose diagrams. Geometrical elements: taxi ways and runways, pattern of runway capacity. Zoning regulations, approach area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc.

Text Books:

1. Gurucharan Singh, Highway Engineering, Standard Publishers Distributors.
2. S.K. Khanna, C.E.G. Justo Highway Engineering by, Nem Chand Bros.
3. S.K. Khanna, M. G. Arora, Airport Planning & Design by, Nem Chand Bros.

Reference Books:

1. O'Fleherly Edward, Highway Engineering , Arnold Publishers Ltd, UK
2. S.K. Khanna, Laboratory Mannual, S.Chand
3. Horonjeff Robert "The Planning & Design of Airports" TMH

Propose List of Practicals

1. Los angeles abrasion test
2. Aggregate crushing value test
3. Aggregate impact test
4. Shape test
5. Bitumen content by centrifuge extractor
6. Ductility test
7. Flash and fire point test
8. Penetration test
9. Softening point test
10. Marshall mix design

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Course Code	Course Name	Hours per Week			Total
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CE3EL04	Building Maintenance & Repairs	3	0	0	3

Unit: I

Influence on serviceability and Durability-Effects due to climate, Temperature, Chemicals, Wear and Erosion, Design and Construction errors, Corrosion Mechanism, Inhibitors, Corrosion Resistant Steels, Coatings.

Unit: II

Maintenance and repair Strategies: Definitions-Maintenance, repair and rehabilitation, Facets of Maintenance, Importance of Maintenance, Preventive Measures on Various Aspects, Inspection, Assessment Procedure for Evaluating for Damaged Structures, Causes of Deterioration, Testing Techniques.

Unit: III

Materials for Repairs-special concretes and Mortar, Concrete chemicals, Special Elements for accelerated strength gain, Expansive cement, Polymer Concrete, Sulphur Infiltrated Concrete, Ferro Cement.

Unit: IV

Examples of Repair to Structures- Repairs to overcome low member strength, deflection, cracking, chemical disruption, weathering wear, fire, leakage, marine exposure.

Unit: V

Introduction to demolition; steps before demolition: Surveying, Removal of hazardous material, Preparation of plan, Stability report, Safety measures; Methods Of Demolition: Non-explosive demolition, Explosive demolition, engineered demolition techniques for dilapidated structures – case studies.

Text Books:

1. P.S Gahlot and Sanjay Sharma "Building repair and maintenance management" . , CBS PUBLISHER
2. M.S. Shetty, "Concrete Technology – Theory and Practice" S. Chand, New Delhi
3. Richard J.Diven and Mark Shaurette, "Demolition –Practices, Technology and Management" Purdue university press

Reference Books:

1. Dennison Campbell, Allen and Harold Roper, "Concrete Structure-Materials, Maintenance and Repair", , Longman Scientific and Technical UK
2. P.C Varghese, "Maintenance repair and rehabilitation and minor works of buildings" Prentice Hall India learning private limited
3. S.M. Johnson, Deterioration and maintenance and repair of building, McGraw Hill Publishers,

Course Code	Course Name	Hours per Week			Total
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EN3MC01	Self Study(MOOC)	1	0	0	0

COURSE OBJECTIVE – To register in eight weeks durations courses of NPTEL from NPTEL portal and to follow the instructions provided by them time to time.

Different courses by name are:

1. Sustainable engineering concept and life cycle analysis. Institute: IIT KGP
2. Hydration, Porosity & strength of cementitious materials .Institute: IIT K
3. Digital land surveying and mapping .Institute: IIT R

NOTE: Any other such short courses from reputed sources may also be entertained with prior permission of the course in-charge.

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